particular image **120** in time. In image **120**, there are two features **122** based on two distinct touches. The touches may for example be formed from a pair of fingers touching the touch screen. As shown, each feature **122** includes unique identifier (ID), x coordinate, y coordinate, Z magnitude, angle **0**, and area A. More particularly, the first feature **122**A is represented by ID_1, x_1, y_1, Z_1, θ_1, A_1 and the second feature **122**B is represented by ID_2, x_2, y_2, Z_2, θ_2, A_2. This data may be outputted for example using a multitouch protocol.

[**0074**] The conversion from data or images to features may be accomplished using methods described in copending U.S. patent application Ser. No. 10/840,862 which is hereby incorporated herein by reference. As disclosed therein, the raw data is received. The raw data is typically in a digitized form, and includes values for each node of the touch screen. The values may be between 0 and 256 where 0 equates to no touch pressure and 256 equates to full touch pressure. Thereafter, the raw data is filtered to reduce noise. Once filtered, gradient data, which indicates the topology of each group of connected points, is generated. Thereafter, the boundaries for touch regions are calculated based on the gradient data, i.e., a determination is made as to which points are grouped together to form each touch region. By way of example, a. watershed algorithm may be used. Once the boundaries are determined, the data for each of the touch regions are calculated (e.g., x, y, Z, θ, A).

[**0075**] Following block **104**, multipoint processing method **100** proceeds to block **106** where feature classification and groupings are performed. During classification, the identity of each of the features is determined. For example, the features may be classified as a particular finger, thumb, palm or other object. Once classified, the features may be grouped. The manner in which the groups are formed can widely varied. In most cases, the features are grouped based on some criteria (e.g., they carry a similar attribute). For example, the two features shown in **FIGS. 3A and 3B** may be grouped together because each of these features is located in proximity to each other or because they are from the same hand. The grouping may include some level of filtering to filter out features that are not part of the touch event. In filtering, one or more features may be rejected because they either meet some predefined criteria or because they do not meet some criteria. By way of example, one of the features may be classified as a thumb located at the edge of a tablet PC. Because the thumb is being used to hold the device rather than being used to perform a task, the feature generated therefrom is rejected, i.e., is not considered part of the touch event being processed.

[**0076**] Following block **106**, the multipoint processing method **100** proceeds to block **108** where key parameters for the feature groups are calculated. The key parameters may include distance between features, x/y centroid of all features, feature rotation, total pressure of the group (e.g., pressure at centroid), and the like. As shown in **FIG. 4**, the calculation may include finding the centroid C, drawing a virtual line **130** to each feature from the centroid C, defining the distance D for each virtual line (D_1 and D_2), and then averaging the distances D_1 and D_2. Once the parameters are calculated, the parameter values are reported. The parameter values are typically reported with a group identifier (GID) and number of features within each group (in this case three). In most cases, both initial and current parameter values are reported. The initial parameter values may be based on set down, i.e., when the user sets their fingers on the touch screen, and the current values may be based on any point within a stroke occurring after set down. As should be appreciated, blocks **102-108** are repetitively performed during a user stroke thereby generating a plurality of sequentially configured signals. The initial and current parameters can be compared in later steps to perform actions in the system.

[**0077**] Following block **108**, the process flow proceeds to block **110** where the group is or associated to a user interface (UI) element. UI elements are buttons boxes, lists, sliders, wheels, knobs, etc. Each UI element represents a component or control of the user interface. The application behind the UI element(s) has access to the parameter data calculated in block **108**. In one implementation, the application ranks the relevance of the touch data to the UI element corresponding there to. The ranking may be based on some predetermine criteria. The ranking may include producing a figure of merit, and whichever UI element has the highest figure of merit, giving it sole access to the group. There may even be some degree of historesis as well (once one of the UI elements claims control of that group, the group sticks with the UI element until another UI element has a much higher ranking). By way of example, the ranking may include determining proximity of the centroid (or features) to the GUI object associated with the UI element.

[**0078**] Following block **110**, the multipoint processing method **100** proceeds to blocks **112** and **114**. The blocks **112** and **114** can be performed approximately at the same time. From the user perspective, in one embodiment, the blocks **112** and **114** appear to be performed concurrently. In block **112**, one or more actions are performed based on differences between initial and current parameter values as well as the UI element to which they are associated. In block **114**, user feedback pertaining to the one ore more action being performed is provided. By way of example, user feedback may include display, audio, tactile feedback and/or the like.

[**0079**] **FIG. 5** is a parameter calculation method **150**, in accordance with one embodiment of the present invention. The parameter calculation method **150** may, for example, correspond to block **108** shown in **FIG. 2**. The parameter calculation method **150** generally begins at block **152** where a group of features is received. Following block **152**, the parameter calculation method **150** proceeds to block **154** where a determination is made as to whether or not the number of features in the group of features has changed. For example, the number of features may have changed due to the user picking up or placing an additional finger. Different fingers may be needed to perform different controls (e.g., tracking, gesturing). If the number of features has changed, the parameter calculation method **150** proceeds to block **156** where the initial parameter values are calculated. If the number stays the same, the parameter calculation method **150** proceeds to block **158** where the current parameter values are calculated. Thereafter, the parameter calculation method **150** proceeds to block **150** where the initial and current parameter values are reported. By way of example, the initial parameter values may contain the average initial distance between points (or Distance (AVG) initial) and the current parameter values may contain the average current distance between points (or Distance (AVG) current). These